



US Army Corps  
of Engineers®  
Engineer Research and  
Development Center

Ongoing Research

# Battlespace Terrain and Reasoning Awareness-Battle Command (BTRA-BC)

**Problem** Terrain and weather effects represent a fundamental, enabling piece of battlefield information supporting situation awareness and the decision-making processes within Command, Control, Communications, Computer, Intelligence, Surveillance and Reconnaissance (C4ISR). These effects can both enhance or constrain force tactics and behaviors, platform performance (ground and air), system performance (e.g., sensors) and the Soldier. BTRA-BC focuses on the development of software analytics designed to create information and knowledge products that capture integrated terrain and weather effects and develop predictive decision tools to exploit those products. The ultimate objective is to empower commanders, Soldiers, and systems with information that allows them to understand and incorporate the impacts of terrain and weather on their functional responsibilities and processes.

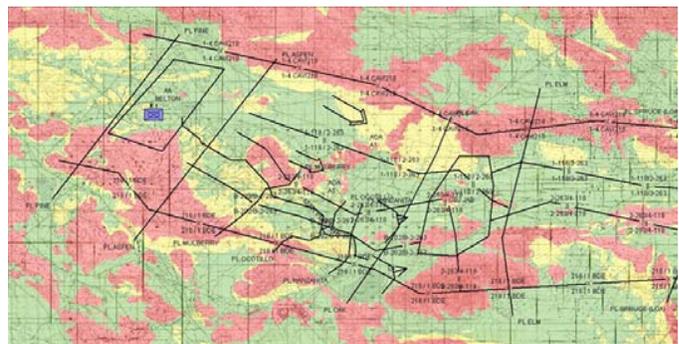
**Description of Research** BTRA-BC developments stress computational efficiency and seek to maximize the ratio between the actionable information content of its products and the size of the products to ensure that they can be transmitted over tactical communication networks. BTRA decision tools are designed and engineered to be embeddable in other host C4ISR systems and applications, or as services within a system of systems.

**Expected Products** BTRA-BC focuses on the development of six information generation components and five decision tools addressing terrain and weather effects. Each of these components uses terrain feature data; digital elevation models; current and forecasted weather; and information on tactics, techniques, and system performance. BTRA-BC generates information addressing: (1) Observation, Cover and Concealment, Obstacles and Mobility, Key terrain and Avenues of approach (OCOKA), (2) integrated products defining operational Positions of Advantage, (3) high-fidelity weather/terrain effects of mobility and signature physics, (4) advanced mobility analysis, (5) digital ground and air maneuver potential and (6) tactical structures relating information produced by the other components.

Decision tools operate on BTRA-BC information products, not the original data. These tools support:

(1) predictive multi-criteria, multi-objective maneuver and logistical route analysis for ground and air platforms and forces, (2) predictive sensor performance (e.g., infrared (IR), millimeter wave [MMW], seismic and acoustic), (3) terrain based Common Operating Area (COA) evaluation and wargaming, and (4) predictive threat assessment.

**Potential Users** BTRA products will empower a spectrum of users (commanders, soldiers, and systems) with information that allows them to understand and incorporate the impacts of terrain and weather on their functional responsibilities and processes.



**Projected Benefits**

BTRA-BC will continue research and development (R&D) through 2010. Mature BTRA-BC components, under funding from the Office of the Secretary of Defense, will transition current and maturing capabilities to National Geospatial Intelligence Agency's (NGA's) Commercial Joint Mapping Toolkit (CJMTK), Digital Topographic Support System (DTSS) and the Future Combat Systems (FCS). Under a Technology Transition Agreement, the ERDC will embark on joint technology development of CJMTK with the NGA.

**Program Manager**

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**Participating ERDC  
Laboratory**

Topographic Engineering Center (TEC)